

High Fidelity Simulation of Jet Noise Emissions from Rectangular Nozzles, Phase II

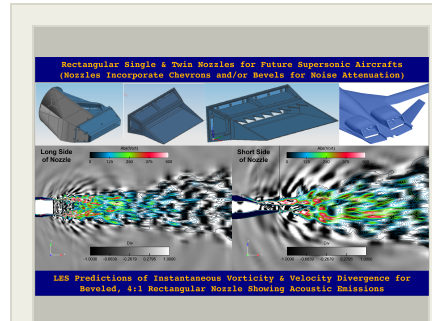
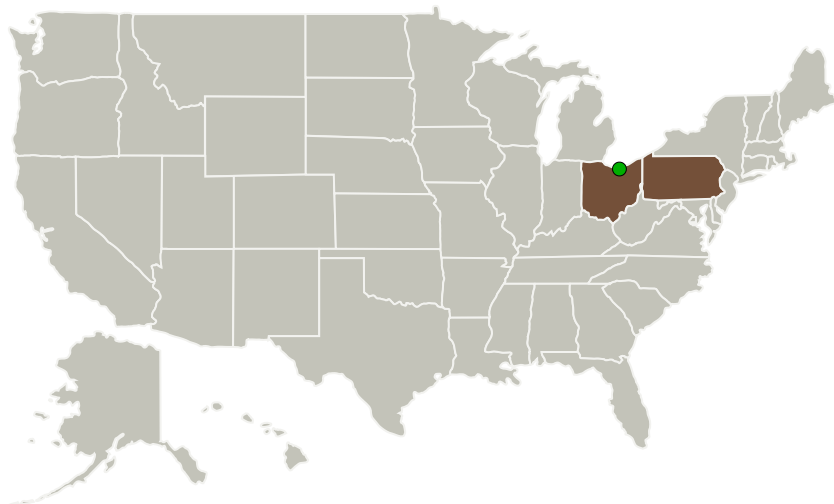
Completed Technology Project (2012 - 2016)



Project Introduction

The proposed SBIR Phase II program will lead to the validation of a state-of-the-art Large Eddy Simulation (LES) model, coupled with a Ffowcs-Williams-Hawkings (FW-H) farfield acoustic solver, for supporting the development of advanced engine concepts, including innovative flow control strategies for attenuation of their jet noise emissions. During Phase I, the LES/FW-H model was validated against matched sets of flowfield and companion acoustic data acquired at NASA/GRC for round nozzles. The flowfield validation included detailed comparisons against imagery, mean flow measurements and turbulence statistics. During Phase II, the end-to-end LES/FW-H noise prediction model will be demonstrated and validated by applying it to high aspect-ratio rectangular nozzle designs, proposed for testing at NASA GRC under the Fundamental Aeronautics Program. The model will also be validated against acoustic and flowfield data from a realistic jet-pylon experiment, thereby significantly advancing the state-of-the-art for LES. This critical validation will provide the foundation for proceeding to application of this innovative methodology in supporting the design and optimization of control concepts, e.g. chevrons, bevels, etc., as well as ultimately performing predictions of noise emissions from full-scale, realistic nozzles with complex exhaust flowpaths, airframe/propulsive jet interactions, etc.

Primary U.S. Work Locations and Key Partners



High Fidelity Simulation of Jet Noise Emissions from Rectangular Nozzles Project Image

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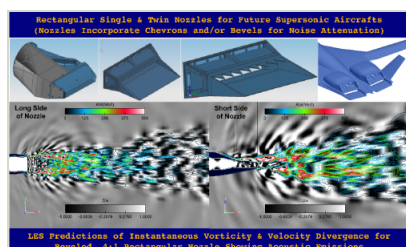


Organizations Performing Work	Role	Type	Location
CRAFT Tech - Combustion Research and Flow Technology	Lead Organization	Industry	Pipersville, Pennsylvania
● Glenn Research Center(GRC)	Supporting Organization	NASA Center	Cleveland, Ohio

Primary U.S. Work Locations

Ohio	Pennsylvania
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Images



Project Image

High Fidelity Simulation of Jet Noise Emissions from Rectangular Nozzles
Project Image
(<https://techport.nasa.gov/image/129085>)

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Organization:

CRAFT Tech - Combustion Research and Flow Technology

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

Project Management

Program Director:

Jason L Kessler

Program Manager:

Carlos Torrez

Principal Investigator:

Neeraj Sinha

Co-Investigator:

Neeraj Sinha

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Technology Maturity (TRL)

Start: 3
Current: 5
Estimated End: 5



Technology Areas

Primary:

- TX15 Flight Vehicle Systems
 - TX15.1 Aerosciences
 - TX15.1.4 Aeroacoustics

Target Destinations

The Sun, Earth, The Moon, Mars, Others Inside the Solar System, Outside the Solar System